

REMARKS

This is a full and timely response to the outstanding Action mailed July 23, 2004. Upon entry of the amendments in this response, claims 26 -45 remain pending. In particular, Applicant has amended claims 31, 33 and 35, and has added claims 37 - 45. Reconsideration and allowance of the application and presently pending claims are respectfully requested.

Rejections under 35 U.S.C. § 103

The Office Action indicates that claims 26 - 35 stand rejected under 35 U.S.C 103(a) as being unpatentable over *Puchner* (U.S. 6,342,429) in view of *Noble* (U.S. 5,726,095). Additionally, the Office Action indicates that claim 36 stands rejected under 35 U.S.C 103(a) as being unpatentable over *Puchner* in view of *Noble*, and further in view of *Eklund* (U.S. Publication No. 2003/0096466). Applicant respectfully traverses the rejections.

Turning first to the cited references, Applicant notes that in Fig. 2D, *Puchner* discloses a trench (206) formed by indium implantation. (See abstract and col. 3, lines 63-64). The indium implantation is performed to form an indium field at the bottom of an STI trench (206). Thus, the implanted indium keeps the concentration of p-dopant at the p-n well junction under the STI interface high, so that punch-through is avoided. Note that the indium field is formed at the bottom of the STI trench, unlike the indium doped region located adjacent to top corners of the STI trench according to claims 26 and 37. Since the indium field of the cited reference is located at the bottom of the STI trench, Applicant respectfully asserts that the claimed invention patentably defines over *Puchner*.

As shown in Figs. 3L-3M of *Noble*, *Noble* discloses a MOSFET device. A gate layer (16) and a gate oxide layer (26') are formed over an active region (12). STI structures (14) are located at both sides of the active region (12). The gate layer (16) is surrounded by tungsten metallization (18) with windows opening to the oxide layer over the drain and source areas of active region (12). However, *Noble* does not disclose the indium doped region located adjacent to top corners of the STI trench according to claims 26 and 37. Since *Noble* does not exhibit such an indium doped region, Applicant respectfully asserts that the claimed invention patentably defines over *Noble*.

Moreover, even if the teachings of *Noble* are combined with those of *Puchner*, Applicant respectfully asserts that the combination does not teach or reasonably suggest at least these features mentioned above. Specifically, the cited combination does not teach or reasonably suggest said active area having an indium doped region that is adjacent to top corners of said shallow trenches. Applicant also respectfully asserts that *Eklund* does not teach or reasonably suggest these features either.

Turning now to the claims, claim 26 recites:

26. A NMOS transistor having an improved narrow width V_t roll-off, comprising:
 - (a) a substrate that includes shallow trench isolation (STI) features which are comprised of a shallow trench with sloped sidewalls and a bottom, an oxide liner formed on said shallow trench sidewalls and bottom, and an insulator layer formed on said oxide liner that fills said shallow trench and extends to a level that is above the top of said substrate;
 - (b) an active area formed between two adjacent shallow trenches in said substrate, *said active area having an indium doped region that is adjacent to top corners of said shallow trenches*;
 - (c) a gate dielectric layer formed on said active areas; and
 - (d) a patterned gate layer formed on said gate dielectric layer wherein said gate layer extends over said adjacent shallow trenches.

(Emphasis added).

Applicant respectfully asserts that the cited art of record, either individually or in combination, is legally deficient for the purpose of rendering obvious claim 26. Specifically, Applicant respectfully asserts that the cited art does not teach or reasonably suggest at least the features/limitations emphasized above in claim 26. Therefore, Applicant respectfully assert that claim 26 is in condition for allowance. Since claims 27 – 36 are dependent claims that incorporate all the features/limitations of claim 26, Applicant respectfully asserts these claims also are in condition for allowance. Additionally, these claims recite other features/limitations and combinations thereof that may serve as an independent basis for patentability.

Newly Added Claims

Upon entry of the amendments in this response, Applicant has added new claims 37 – 45. Specially, new independent new claim 37 has been added to recite said active area having an indium doped region that is adjacent to top corners of said shallow trenches and extends under part of the gate dielectric layer. Support for this limitation can be found, for example, at Fig. 10 and page 16, lines 2-5 of the specification. Thus, Applicant respectfully asserts that no new matter has been added.

Applicant respectfully asserts that the cited art of record, either individually or in combination, is legally deficient for the purpose of rendering claim 37 unpatentable. Specifically, Applicant respectfully asserts that the cited art does not teach or reasonably suggest at least the features/limitations mentioned above. Therefore, Applicant respectfully assert that claim 37 is in condition for allowance.

Since claims 38 – 45 are dependent claims that incorporate all the features/limitations of claim 37, Applicant respectfully asserts these claims also are in condition for allowance. Additionally, these claims recite other features/limitations and combinations thereof that may serve as an independent basis for patentability.

Cited Art Made of Record

The cited art made of record has been considered, but is not believed to affect the patentability of the presently pending claims.

CONCLUSION

In light of the foregoing amendments and for at least the reasons set forth above, Applicants respectfully submit that all objections and/or rejections have been traversed, rendered moot, and/or accommodated, and that the now pending claims are in condition for allowance. Favorable reconsideration and allowance of the present application and all pending claims are hereby courteously requested. If, in the opinion of the Examiner, a telephonic conference would expedite the examination of this matter, the Examiner is invited to call the undersigned attorney at (770) 933-9500.

No fee is believed to be due in connection with this amendment and response to Office Action. If, however, any fee is believed to be due, you are hereby authorized to charge any such fee to deposit account No. 20-0778.

Respectfully submitted,



Daniel R. McClure, Reg. No. 38,962

THOMAS, KAYDEN, HORSTEMEYER & RISLEY, L.L.P.
Suite 1750
100 Galleria Parkway N.W.
Atlanta, Georgia 30339
(770) 933-9500